

THE IMPACT OF FERAL CATS AND DOGS ON POPULATIONS OF THE WEST INDIAN ROCK IGUANA, *CYCLURA CARINATA*

JOHN B. IVERSON

Abstract

A population of rock iguanas, *Cyclura carinata*, inhabiting Pine Cay in the Caicos Islands was nearly extirpated during the three years following construction of a hotel and tourist facility. The decline, from an estimated adult lizard population of nearly 5500, was due primarily to predation by domestic dogs and cats introduced to the island simultaneously with hotel construction. Population declines on other nearby islands were also attributed to predation by these feral mammals.

Introduction

Among the most rapidly declining of the world's reptile species are the rock or ground iguanas of the genus *Cyclura*. These primarily herbivorous lizards are endemic to the West Indies, and their populations are steadily dwindling in the face of man's intervention. The decline of populations of the rock iguanas, as well as those of the marine and land iguanas (*Amblyrhynchus* and *Conolophus*) in the Galapagos, is usually blamed on predation by, or competition with, introduced feral mammals such as rats, dogs, cats, goats, pigs and mongooses (Lewis, 1944; Dowling, 1964; Carey, 1975; and review in Wiewandt, 1977). However, the direct effects of the introduction of these animals on undisturbed, relatively natural populations of iguanas have been poorly documented. This paper relates the systematic extirpation of an island population of the Turks and Caicos Islands iguana, *Cyclura carinata*, following the introduction of cats and dogs.

Materials and Methods

The natural history and social behavior of *Cyclura carinata* were studied on Pine Cay and adjacent islands in the Caicos Islands, British West Indies, between September 1973 and June 1976. The results of the behavior and ecology study, as well as locations and complete descriptions of the study islands, appear in Iverson (1977).

Pine Cay (350 ha) was chosen as the principal study island in 1973 not only because of the obvious abundance of lizards, but also because construction of a large hotel and clubhouse complex had just begun on the island. This offered the opportunity to record the effects of increased human occupation on a heretofore relatively undisturbed iguana population.

A flush transect method similar to the "King strip census" (see Giles, 1971), for discussion) was utilized for lizard density and population size estimates. Flush transect data were used to compute adult lizard densities by four methods. The first (Method A) was a modification of the Frye strip census method as used by Overton (1953) for quail. The second method (Method B) utilized only the number of lizards flushed within 10 m of the transect, and assumed that all lizards within this boundary could be seen or heard. The density was expressed in the formula:

$$\text{Density} = \frac{\text{Number}}{\text{Area}} = \frac{N}{dL}$$

where N = number of lizards flushed within 10 m, L = length of transect, d = width of transect (in this case, 20 m).

Method C was a variation of the King strip census method as discussed by Hayne (1949) and expanded by Giles (1971). The final method (D) was that of Gates *et al.* (1968). Calculations, application, and acceptability of each of these methods to the lizard data are discussed in Iverson (1977). Only those data from transects yielding maximum density values are reported here.

Results and Discussion

Sector A of the transect route, because of its proximity to human activity, supported extremely low densities of lizards even at the beginning of the study. Data from that sector were therefore excluded from the initial mean density calculation. That value, obtained by averaging all density estimates obtained for sectors B through F by all four methods in June and July 1974, was 26.88/ha. This compares well with the value of 31.1/ha based on known adult inhabitants of optimum habitat at the SW Blind study area at that time. Based on area and density values for primary habitats on Pine Cay at that same time (early summer, 1974) the adult *Cyclura* population was estimated at nearly 5500 (Iverson, 1977).

Both the maximum number of iguanas encountered on flush transects and the densities computed from those transects decreased steadily during the study period. These data also clearly indicate the effects of proximity to human settlement: lizards in those sectors nearest to human activity showed the earliest declines and disappeared first. Since lizards were not disturbed or removed from the transect route in the course of my studies, their disappearance was presumed to be entirely the result of other human-related interferences.

The entire iguana population on Pine Cay, estimated to exceed 15,000 individuals in June and July 1974 (Iverson, 1977), was almost completely extirpated during the following two years. Not a single iguana was flushed during five transects, and evidence (by spoor) of only five iguanas (4 large males and 1 young adult) was found on the entire island during a week of investigation in June 1976. *Cyclura carinata* had thus been nearly extirpated from Pine Cay. A similar decline also occurred on Water Cay, connected by a narrow isthmus to Pine Cay. However, no such declines were noted on Little Water Cay or Fort George Cay (at least until 1976), both of which had received very little human interference in recent history (but see later). The relationship of the observed population decreases to human occupation cannot be denied.

Of all the ramifications of human exploitation, those which most affect the survival of *Cyclura carinata* are habitat destruction and direct predation by man and animals introduced by him. Iguanas are clearly rare or absent from the larger islands of the Turks and Caicos banks, i.e. those most populated with humans and feral mammals. However, as is the case for many of the world's wildlife species (Denney, 1974), domestic dogs (*Canis familiaris*) and cats (*Felis domesticus*) apparently represent the greatest threat to *Cyclura carinata* populations, and have been the most significant contributors to the demise of iguanas on at least Pine and Water Cays. This determination was based on direct observations as well as circumstantial evidence.

Cats -- Prior to the construction of the hotel on Pine Cay in 1973, only a few cats lived on the island. There was, moreover, little evidence that these feral cats were affecting the dense iguana population. I believe this can be attributed to their very low numbers and the presence

of a more easily available food source: rats thrived on Pine Cay in high densities in the 1950s and 1960s (Rueb & Hayden, 1957; Liam Maguire and George Nipanich, pers. comm.).

When hotel construction began in September 1973, there was a sudden influx of staff and workmen, many of whom brought cats and dogs. Many of these free-ranging pets became feral, mother cats repeatedly removing litters born in residences to the "bush" (personal observation). Initially, rats may have provided a ready food resource. The once dense rat populations soon virtually disappeared, with only small populations remaining around older buildings (Liam Maguire, pers. comm.; and personal observation). At this point, the cats apparently preyed upon a higher proportion of lizards, crabs, and birds, suggested by observations of their feeding behavior and examination of fecal pellets.

The cats on Pine Cay employed at least three foraging strategies to obtain lizards, depending on the time of day. During early morning hours, before lizard emergence, they excavated shallow burrows inhabited by curly-tail lizards (*Leiocephalus*) and juvenile *Cyclura*. This was presumably also the case in later afternoon following submergence, although this was not documented. I saw cats with freshly caught lizards in their mouths as early as 15 to 20 minutes before sunrise, and up to 2 hours before typical iguana emergence times. As lizard burrows have a distinct odor, detectable at their entrances by even the human nose, I believe that cats are capable of following the odor gradient to its greatest concentration at the burrow. Support for this comes from observations made when captive juvenile *Cyclura* placed in plastic bags were occasionally brought into my quarters for measurement. Within minutes, cats were scratching at the door to gain entry. If allowed to enter they would always find the lizards within 30 seconds, even when the plastic bags were hidden under cloth bags on top of an overhead shelf. Such capabilities greatly decrease search times and increase prey capture success.

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Letters to the Editor

Dr. Richard R. Montanucci, Editor I.I.S.
Department of Biological Sciences
Clemson University
132 Long Hall
Clemson, South Carolina 29631

IGUANA TIMES STAFF

EDITOR RICHARD MONTANUCCI
ART/GRAPHICS GUANA BOB
WORD PROCESSING LINDA + CO.
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